Synthesis and characterization of Rh/MnO_2-CeO_2/Al_2O_3 catalysts for CO-PrOx reaction

Tables

Table 1. CeO_2 crystallite size, lattice parameter and Ov/F2g area ratio

Code	[a]Crystalline domain size of CeO_2 (nm)	[b]Lattice parameter(Å)	[c]Ov/F2g area ratio	
CeO_2	-	5.414	-	-
$RhCe_{50}Al$	7.7	5.401	-	
$RhCe_{40}Mn_{10}Al$	5.7	5.381	0.26	
$RhCe_{20}Mn_{30}Al$	5.5	5.362	0.36	

[a] Calculated from XRD data, with Scherrer's equation and (111) crystallographic plane

[b] Calculated from XRD data, with Bragg's equation for a cubic cell

[c] Calculated from Raman spectra (zoom Fig. 3).

Table 2. Textural properties for the synthesized materials

Code	SBET ($m^2\ g^{-1}$)	Pore volume ($cm^3\ g^{-1}$)	Pore size (nm)
$RhCe_{50}Al$	90	0.21	8.5
$RhCe_{40}Mn_{10}Al$	87	0.14	7.2
$RhCe_{20}Mn_{30}Al$	45	0.10	5.8
$RhCe_{10}Mn_{40}Al$	46	0.10	5.9
$RhMn_{50}Al$	41	0.08	5.1

Table 3. H_2-TPR results: Experimental hydrogen consumption and Reducibility percentage (RP) of the samples

Code	H_2 consumption (mm/g)	RP (%)
$RhCe_{50}Al$	5.046	85.1
$RhCe_{40}Mn_{10}Al$	5.095	86.1
$RhCe_{20}Mn_{30}Al$	5.883	99.9

$RhCe_{10}Mn_{40}Al$	5.542	94.3
$RhMn_{50}Al$	5.319	90.7

Table 4. Temperature (in °C) and weight loss (in parenthesis, %) of the different processes from TGA-DTG experiments

Code	Physisorbed Water	Structural Water	$MnO_2 \rightarrow Mn_2O_3$	$Mn_2O_3 \rightarrow Mn_3O_4$
$RhCe_{50}Al$	61 (1.30%)	--	-	-
$RhCe_{40}Mn_{10}Al$	61 (1.68%)	--	561 (0.55%)	--
$RhCe_{20}Mn_{30}Al$	61 (1.52%)	181 (3.35%)	659 (4.89%)	994 (3.06%)
$RhCe_{10}Mn_{40}Al$	61 (1.79%)	134 (3.19%) 206 (1.31%)	665 (5.82%)	974 (4.22%)
$RhMn_{50}Al$	61 (2.88%)	130 (5.21%) 277 (4.28%) 300 (2.00)	688 (4.85%)	990 (1.86%)